Electronic Supplementary Information (ESI)

A room temperature approach for the fabrication of aligned TiO_2 nanotube arrays on transparent conducting substrate

Ruosha Zeng, [‡ ab] Ke Li,[‡bc] Xia Sheng,[b] Liping Chen,[b] Haijiao Zhang[a] and Xinjian Feng*[b]

a. College of Environmental and Chemical Engineering, Shanghai University, Shanghai 200444, P. R. China.

b. College of Chemistry, Chemical Engineering and Materials Science, Soochow University, Suzhou 215123, P. R. China. E-mail: xjfeng@suda.edu.cn

c. Nano Science and Technology Institute, University of Science and Technology of China, Suzhou 215123, P. R. China.

Experimental Section

Ordered rutile TiO_2 NW arrays are synthesized via a conventionally hydrothermal method. In a typical experiment, fluorine-doped tin oxide coated glass substrates (Tech 8) are loaded into Teflon-lined stainless steel reactors (23 ml) that filled with 6 mL DI water, 6 mL 37% hydrochloric acid and 0.2 mL tetrabutyl titanate, and kept at 180 ^oC for 1-4 h. In-situ conversion of TiO_2 NWs to NTs is processed as following: the as-grown TiO_2 NWs is immersed in a fresh H_2O_2 (30 wt%) /NH_4OH (25 wt%; v:v = 10:1) solution for 60 to 120 min at room temperature and then rinsed with a copious amount of distilled water. Finally the obtained samples are annealed at 450 ^oC for 30 min in oxygen-rich environment with the oxygen flow rate of 0.6 L/min before all measurements.

The structures of the samples are characterization using a field emission scanning electron microscopy (FE-SEM, S4800, Hitachi, Tokyo, Japan), high resolution transmission electron microscopy (HR-TEM, Tecnai F20, FEI, Hillsboro, OR, USA), and selected area electron diffraction (SAED). The crystal phase structures of the samples are investigated using an X-ray powder diffractometer (X'Pert PRO, PANalytical, Almelo, The Netherlands). Transient

photovoltage (TPV) spectrum is recorded by a digital phosphor oscilloscope (TDS3054C, Tektronix, USA) with a 355 nm line of Nd:YAG laser as the excitation light source (Brio, Quantel, USA). Dye desorption characters is measured by UV-VIS spectra (Ocean Optics, Maya 2000 pro, USA).

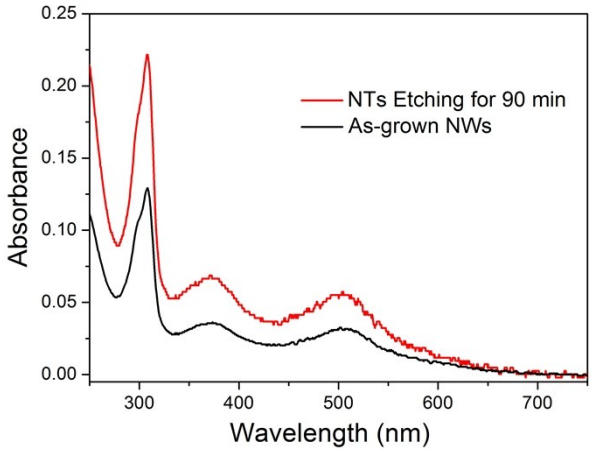

Fig. S1: UV-VIS spectra of dye solutions that desorbed from TiO_2 NW and NT arrays.

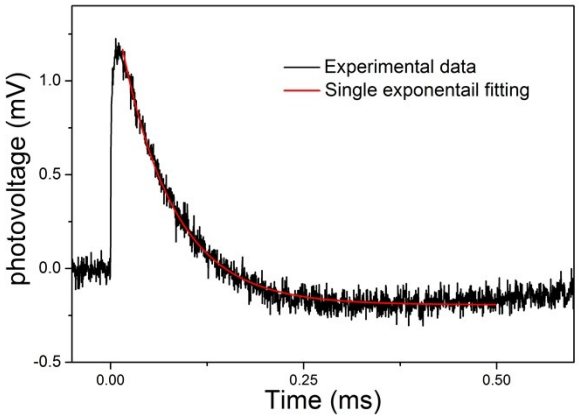

Fig. S2: TPV spectra of rutile 25 nm TiO_2 particles and the single exponential fitting curve.